Resonance Evaluation for ^{103}Rh in the Resolved Resonance Region from 0 to 8 keV

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This paper reports on the evaluation of the resonance parameters and their respective covariance for ^{103}Rh in the resolved resonance region from thermal up to 8 keV. Rhodium is an important fission product nuclide with a significant macroscopic capture cross section in spent nuclear fuel. The buildup of fission products in spent nuclear fuel account for a reactivity decrease (burnup credit). Such burnup credit may lead to cost savings in the packaging, transportation, and storage of spent nuclear fuel. Accurate knowledge of the fission product absorption cross section is needed to ensure reliable estimation of any bias and uncertainty resulting from the codes and data used to predict the system neutron multiplication factor, k-eff.

Resonance parameters and covariances for rhodium were determined by a self-consistent analysis of relevant experimental data, namely, high-resolution transmission and capture cross section data. The multilevel R-matrix code SAMMY was used for the analysis. SAMMY incorporates Doppler and resolution broadening, as well as other experimental effects. In addition to existing experimental data available in the EXFOR system, recent neutron transmission and capture cross section measurements performed at the Geel Electron LINear Accelerator Facility (GELINA) of the Institute for Reference Materials and Measurements (IRMM) were used to extend the upper energy range to 8 keV. The evaluated resonance parameters and covariance were converted into the ENDF format. The cross section processing was done using the NJOY and AMPX codes, whereas the covariance data were processed with the PUFF-IV and ERRORJ codes.